

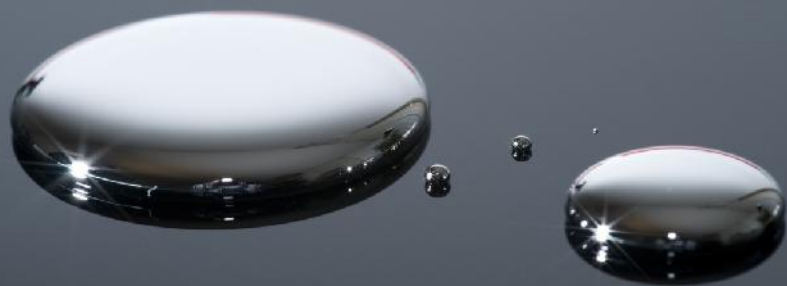
# MERCURY CONTAMINATION INCIDENT – AN INVESTIGATION

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# INTRODUCTION

## Mercury spill in classroom triggers panic

BY PHUAH KEN LIN · 26 MAY 2016 @ 3:11 PM



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BUKIT MERTA JAM: Some 56 students at a secondary school here had a scare today when they spotted spilled mercury inside their classroom.

A Fire and Rescue Department spokesman said its Bukit Mertajam station received a distress call about 10.15am.

No one was injured and the class session proceeded as usual at SMK Guar Perahu.

"A hazardous material (Hazmat) team arrived to clean up the spilled item shortly afterwards.

"Our early investigations showed that the spillage happened yesterday afternoon," he said.

The spokesman said some 30 firemen from the Bukit Mertajam and Prai as well as Jalan Perak stations were roped in to attend to the incident.

### Social Activity

Updates @NST



New Straits Times

@NST\_Online



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Friday 27 May 2016

# Mercury spill at school

BY LO TERN CHERN



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BUKIT MERTAJAM: A mercury spill at a secondary school here led to a four-hour operation by the Fire and Rescue Department which saw 56 students quarantined.

Firemen and officers from the department rushed to SMK Guar Perahu upon receiving a report of the spillage in one of the blocks at the school.

According to the department's spokesman Azman Hussin, they received the call at 10.12am yesterday.

"When firemen arrived at the scene, they discovered stains of about 50ml of spilled mercury.

"The mercury spill was found in two classrooms on the third floor and is believed to have occurred on Wednesday but was only realised yesterday.

"The department's Hazardous Materials Squad (Hazmat) suited in personal protective equipment began cleaning works after ordering students to evacuate the scene.

"The 56 affected students were immediately ordered to be quarantined in a classroom to ensure that they did not come into contact with the mercury.

"Although all students were reported to be safe and unharmed, six of them were brought to hospital for further checks to confirm they were completely safe.

"The scene was confirmed cleaned at 2.16pm," said Azman in a statement yesterday, adding that a total of 28 firemen including officers were involved in the operation.

The inhalation of mercury can affect the nervous, digestive and immune systems, lungs and kidneys, and may be fatal.

## 56 pelajar dikuarantin akibat tumpahan merkuri

27 Mei 2016 12:19 AM

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KIOSKED Ads



BUKIT MERTAJAM 26 Mei – Suasana tenang ketika sesi pembelajaran awal pagi hari ini bagi dua kelas tingkatan empat Sekolah Menengah Kebangsaan (SMK) Guar Perahu Indah di sini bertukar gempar selepas 56 pelajarinya tiba-tiba mengalami masalah pernafasan.

Kejadian pada pukul 10.12 pagi itu disedari guru salah sebuah kelas yang terletak di tingkat dua sebuah bangunan di situ yang kemudian membuat siasatan lanjut.

Hasil maklumat daripada pelajarinya, guru itu mendapati masalah kesihatan yang dialami secara tiba-tiba itu berpunca daripada tumpahan cecair merkuri.

Cecair berbahaya itu didakwa dibawa salah seorang pelajar kelas terbabit dan dikatakan tertumpah di atas lantai semasa mereka bermain di dalam kelas itu tengah hari semalam.

Bimbang dimarahi, pelajar yang membawa cecair itu dari rumahnya berpakat dengan rakan-rakan lain untuk merahsiakannya daripada pengetahuan guru mereka.

Bagaimanapun pagi ini, pencemaran akibat tumpahan itu meninggalkan kesan terhadap dua buah kelas menyebabkan mereka terpaksa dikuarantinkan dalam sebuah kelas lain.

Pihak pentadbir sekolah itu kemudiannya menghubungi Jabatan Bomba dan Penyelamat Bukit Mertajam memaklumkan kejadian berkenaan.

Komander Unit Bahan Berbahaya (Hazmat) balai bomba berkenaan, Penolong Pegawai Bomba (Hazmat) Pulau Pinang, Poh Leong Soon berkata, sekumpulan 28 anggotanya telah ke sekolah tersebut sebaik sahaja menerima laporan dan mendapati terdapat kesan tumpahan merkuri.

“Hasil pemeriksaan lanjut mendapati tumpahan cecair merkuri itu kira-kira 50 mililiter (ml) dan sebagai langkah keselamatan kesemua pelajar itu terpaksa dikuarantin di dalam sebuah kelas lain,” katanya.

Menurut beliau, operasi menyelamatkan dan membersihkan tumpahan cecair kimia itu selesai sepenuhnya pada pukul 2.16 petang dan lokasi berkenaan telah disahkan selamat.

## Sixteen rushed to hospital for suspected mercury poisoning

BY BALVIN KAUR 29 MAY 2016 9:13 PM

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BUTTERWORTH: Sixteen residents of Kampung Baru here were rushed to hospital today for suspected mercury poisoning.

The 16, from six houses, were sent to the Bukit Mertajam Hospital after a mercury spillage occurred at their houses today.

Mercury is deemed extremely toxic, and can be found in thermometers and some fluorescent light bulbs.

Kepala Batas Fire and Rescue Department senior assistant superintendent Abdul Aziz Yusuff said all 16 victims are still being warded and are reportedly stable.

He said the houses of the victims had also been vacated since this morning.

"We were informed that the mercury was brought to the houses by the children of the occupants, who had found it near their homes.

### Social Activity

World News

Salman Masood @salmanmasood

Let's just put it as it is: Hillary Clinton won the first round.

24 m

Salman Masood

"A team of 26 firemen, including hazardous material (Hazmat) personnel from the Kepala Batas, Perai and Jalan Perak Fire and Rescue stations had been carrying out cleaning work since this morning," he told reporters here today.

He said the department is still investigating how the children got hold of the mercury and how it came to be left unattended in the residential area.

This marks the second scare involving mercury this week. On Thursday, 56 students of Sekolah Menengah Kebangsaan Guar Perahu, Bukit Mertajam were also quarantined after a mercury spillage in their classroom.

1896 reads



Sixteen residents of Kampung Baru here were rushed to hospital today for suspected mercury poisoning. Pix by AMIR IRSYAD OMAR.

# NEW STRAITS TIMES

## Students in Malaysia bring mercury to school in plastic bag, forcing 56 to be quarantined

MAY 31, 2016



BUTTERWORTH (THE STAR/ASIA NEWS NETWORK) - The mercury spill at a secondary school in Guar Perahu which led to 56 students being quarantined and 16 residents of six houses in Kampung Baru being hospitalised is believed to have originated from a nearby oil palm plantation in Bukit Tok Alang.

Tasek Gelugor Fire and Rescue Department station chief Muhammad Hayazi Taib said several SMK Guar Perahu students had obtained the mercury from an abandoned water meter room in the plantation.

"They told us that they were in the room taking shelter from the rain when they stumbled upon the silvery liquid on the ground.

"They then collected about 300ml of it and took it to the school in a plastic bag to show their friends on Wednesday.

"We do not know what they did to cause the mercury to spill in two classrooms on the third floor of the school building," he told reporters at the oil palm plantation on Monday (May 30).

The department's Hazardous Materials Squad (Hazmat) spent five hours cleaning up the meter room from 10.30am, using sulphur to contain the mercury around the premises to reduce evaporation before collecting it for disposal.



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RABU 1 JUN 2016 @ 12:18 PM

## Polis siasat kes tumpahan merkuri di Tasek Gelugor



G+1

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ANGGOTA Unit Hazmat Jabatan Bomba dan Penyelamat negeri Pulau Pinang melakukan siasatan di seluruh kawasan rumah yang terlibat dengan kes tumpahan cecair merkuri di Kampung Baru, Tasek Gelugor. - Foto Amir Irsyad Omar

GEORGETOWN: Polis Pulau Pinang akan menyiasat punca tumpahan cecair merkuri sehingga menyebabkan beberapa rumah dan kelas sebuah sekolah di Tasek Gelugor terdedah kepada bahan kimia itu baru-baru ini.

Ketua Polis negeri, Datuk Abdul Ghafar Rajab, berkata walaupun merkuri adalah bahan yang agak berbahaya kepada kesihatan, ia mudah didapati dan tidak tergolong dalam kategori bahan letupan.

"Merkuri bukanlah bahan hakis atau letupan dan ia boleh dibeli (dengan mudah)," katanya selepas Perhimpunan dan Ikrar Bulanan Polis Kontinjen Pulau Pinang di sini, hari ini.

Dalam kejadian Sabtu lalu, 15 penduduk di Jalan Padang Menora, Kampung Baru di Tasek Gelugor dihantar ke hospital untuk pemeriksaan kerana dikhuatiri terdedah kepada cecair merkuri.

Sebelum itu pada 26 Mei, 56 pelajar Sekolah Menengah Kebangsaan Guar Perahu, Bukit Mertajam turut dikuarantin selepas berlaku tumpahan merkuri di kelas mereka.

Dalam perkembangan lain, polis menahan seorang kakitangan awam yang bertugas di Ibu Pejabat Polis Kontinjen Pulau Pinang kerana dipercayai terbabit dengan kes ragut di kawasan Bandar Baru Air Itam, di sini.

Ketua Polis Daerah Timur Laut ACP Mior Faridaltrash Wahid, berkata dalam kejadian jam 6 pagi Selasa lalu, suspek dipercayai meragut beg tangan mangsa yang berumur 42 tahun sehingga menyebabkan mangsa cedera ringan.

"Polis yang sedang menjalankan rondaan menahan suspek yang berusia 28 tahun itu sejurus selepas kejadian dan kes akan disiasat mengikut Seksyen 394 Kanun

## Tumpahan merkuri: Semua 81 individu disyaki tercemar selamat

AZHARI ZAINOODDIN | 04 Jun 2016 5:40 PM

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PULAU PINANG 4 Jun - Semua 81 individu yang dikuatiri tercemar dengan tumpahan merkuri dalam dua kejadian berasingan di negeri ini hujung bulan lalu disahkan selamat.

Timbalan Pengarah Kesihatan negeri (Kesihatan Awam), Dr. Norlia Yahaya berkata, semua mangsa terbabit terdiri daripada 50 penghuni di enam buah rumah di Kampung Baru Jalan Kubang Menerong, Tasik Gelugor dan 61 warga Sekolah Menengah Kebangsaan Guar Perahu Indah, Permatang Pauh yang dikejarkan ke hospital telah dibenarkan pulang ke rumah masing-masing.

Bagaimanapun tegas beliau, perkembangan kesihatan mangsa terlibat akan dipantau dalam tempoh panjang yang mungkin menjangkau lebih 10 tahun.

"Biarpun pemeriksaan menunjukkan semua mangsa tidak terjejas, pemantauan berterusan perlu dilakukan memandangkan kesan merkuri ini boleh memakan masa lama sebelum tanda-tandanya dapat dikesan.

"Setakat ini pemeriksaan darah dan air kencing yang dilakukan terhadap mangsa menunjukkan perkembangan positif biarpun ada beberapa mangsa terlibat sebelum ini menunjukkan seolah-olah adanya tanda tercemar bahan kimia berkenaan," katanya kepada pemberita di sini hari ini.

Terdahulu beliau mengiringi Timbalan Menteri Kesihatan, Datuk Seri Dr. Hilmi Yahaya merasmikan Kempen Anti Merokok 2016 Peringkat Kebangsaan bertemakan Kempen Nafas Baru Bermula Ramadan: Hijrah Hidup Tanpa Rokok di Politeknik Balik Pulau di sini.

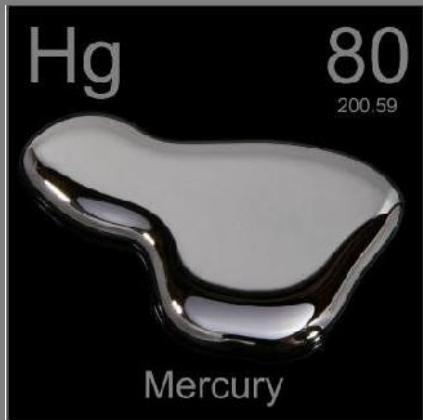
Tambah Norlia, mangsa yang sebelum ini menunjukkan tanda seperti dicemari merkuri membabitkan 33 individu dari Kampung Baru Tasek Gelugor.

"Antara tanda yang ditunjukkan mangsa terlibat adalah batuk, sesak nafas, sakit perut dan pening kepala, namun semua mereka telah diberi rawatan serta menunjukkan perkembangan positif.

"Pihak Kesihatan negeri akan terus memastikan tahap kesihatan semua mangsa terlibat adalah baik dan tidak terjejas demi menjamin kelangsungan hidup mereka," jelas beliau.

Selain itu, katanya, siasatan lanjut sedang diteruskan pihaknya bersama beberapa agensi kerajaan lain berhubung kejadian tumpahan bahan kimia berkenaan termasuk mencari pihak terlibat yang meninggalkan bahan kimia terbabit di sebuah kawasan ladang di negeri ini.

## INTRODUCTION



### WHAT IS MERCURY?

- Mercury (Hg) is a toxic element
- May exist in 3 different forms:
  - Elemental Hg**
    - liquid metal with high vapor pressure
    - Hg vapor denser than air
    - 13 times heavier than water
    - 1 tablespoon of  $\text{Hg}^0$  has a mass of about 150g (1 L Hg ~ 13.5 kg)
  - Inorganic Hg** (dental amalgams & vaccines)
  - Organic Hg** (consumption of fish)
- The main route of concern is **INHALATION**-80% inhaled is absorbed

# INTRODUCTION

## HEALTH EFFECTS OF MERCURY

- Chronic exposure of  $> 1$  month — may damage nervous system & kidney
- Neurologic symptoms include :
  - Decreased nerve impulse conduction
  - Decreased motor skills (hand-eye coordination)
  - Irritability
  - Poor concentration
  - Tremors
  - Incoordination
  - Short-term memory loss
- Other symptoms may include:
  - Abdominal cramps
  - Diarrhea
  - Eye irritation
  - Skin rashes
  - Acrodynia (pink coloured palm & soles of the feet, excessive sweating, itching, joint pain, swelling, weakness, difficulty sleeping)

## CHRONOLOGY OF INCIDENT

**21.5.2016**

- 3 friends : Iskandar (16 years old- SMK Guar Perahu)

Zulkefli (19 years old)

Azlan (18 years old)

Kg. Baru Padang Menora, Tasek Gelugor



Palm oil plantation Bukit Toh Alang — bird hunting



PBA abandoned facility



Mercury found scattered on the floor

## CHRONOLOGY OF INCIDENT

### 22.05.2016

- They came back to get more Hg at the PBA house
- Total Hg collected: 700 ml
- Shared among them & brought home

### 23.05.2016 – 24.05.2016

- Iskandar & Azlan played with Hg at Zulkefli's house

### 25.05.2016

- Iskandar brought Hg to his school and played with his classmates.
- None of the students knew it was Hg
- Not even the teachers
- A Science teacher discovered it was Hg later in the evening
- Students threw Hg into dustbin and some are left on the floor

## CHRONOLOGY OF INCIDENT

### 26.05.2016

- School staff reported about the Hg incident to Fire Department, Royal Police Department (PDRM), Department of Occupational Safety and Health (DOSH), Chemistry Department and Emergency Department of Bukit Mertajam Hospital.
- Fire Department team arrived at school around 10 am to start investigation along with HAZMAT team to start decontamination procedure.
- The Health District Department of Seberang Perai Tengah received notification from Emergency Department of Bukit Mertajam Hospital at 4.30 pm.

### 30.05.2016

- IMR team was called in to assist in investigation
- Together with personnel from KPAS, MOH — Dr Norlen Mohammad

The image shows three individuals in full white protective hazmat suits, including hoods and respirators. They are working at an outdoor site, possibly a hazardous waste disposal or emergency response area. One worker is in the foreground on the left, another is in the background near a doorway, and a third is on the right. The ground is marked with yellow caution tape. There are several white buckets, some with red bags inside, and a green bucket. The buckets have text on them: "KERAJAAN MALAYSIA" and "JPMIT/12/M/12/2008". The scene is set against a light-colored wall with blue trim.

## OBJECTIVES

- To determine Hg vapor concentrations at several affected localities as part of hazardous waste and emergency response to mercury contamination

# METHODOLOGY



NIC EMP-1A Mercury  
Gas Monitor

## BIOLOGICAL SAMPLING

- A total of 146 blood & urine (spot and 24 hours) samples were collected
- 70 samples taken by BMH were index cases and their contacts
- 76 samples taken by Health District Department were staff of government agencies involved in investigation
- All samples were sent to Chemistry Department for further analysis.

## Hg VAPOUR ANALYSIS

- Hg vapour measurements was conducted by IMR team using Nippon Instrument Corporation (NIC) EMP-1A Mercury Gas Monitor
- It records instantaneous data through a data logger
- Five dwellings and two classrooms were selected as sampling locations

**METHODOLOGY**  
House 1



**METHODOLOGY**  
House 2



**METHODOLOGY**  
**House 3,4 & 5**



**METHODOLOGY**  
**Classroom 1**

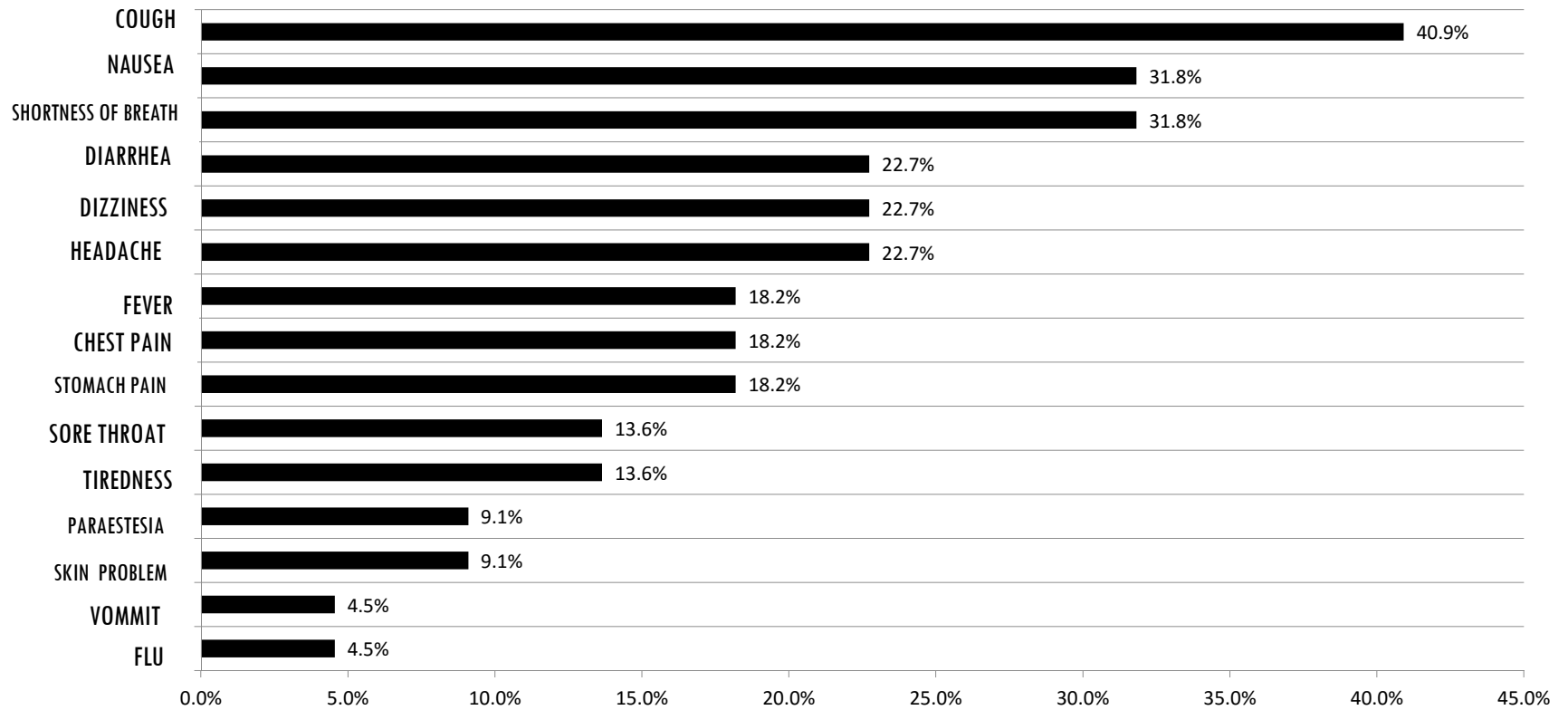


**METHODOLOGY**  
**Classroom 2**



# RESULTS

## PERCENTAGE OF INDIVIDUALS WITH SYMPTOMS OF MERCURY EXPOSURE



SOURCE: PKD SPT

# RESULTS

## BLOOD HG LEVELS

- All exposed individuals showed negative blood Hg levels

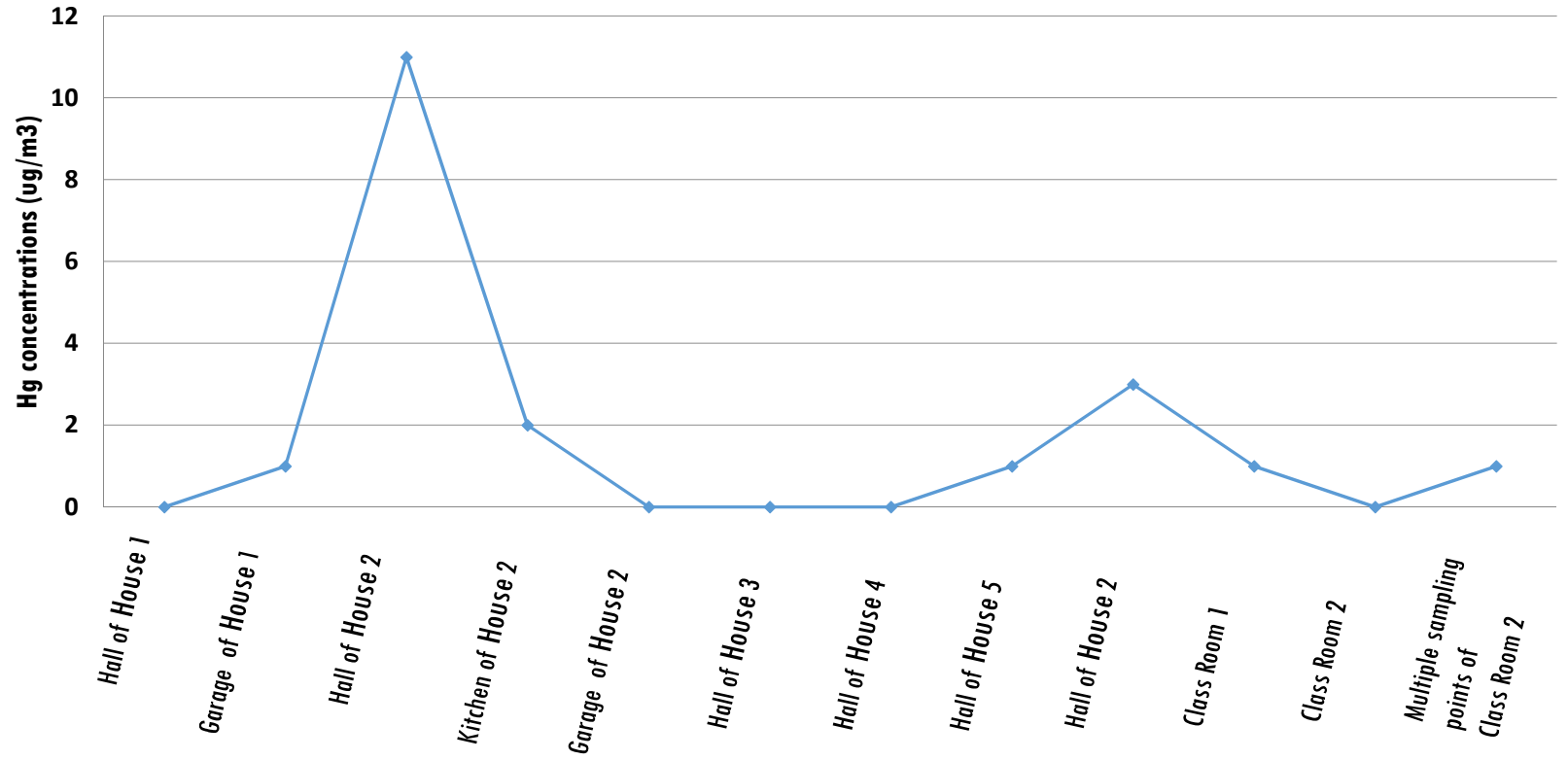
## URINE HG LEVELS

- Majority of the exposed individuals showed negative urine Hg levels HOWEVER 6 individuals (index cases and contact) showed spot urine Hg levels between 0.001  $\mu\text{g/L}$  - 0.009  $\mu\text{g/L}$
- All health staff involved in investigation showed negative urine Hg levels
- The limit of Hg in urine is 0.02  $\mu\text{g/L}$

SOURCE: PKD SPT

# RESULTS

## Average Hg vapor concentrations



## DISCUSSION

### CHELATION THERAPY

- Since all exposed individuals showed non-significant mercury levels for blood and urine, it was decided that chelation therapy will not be proceeded.

### IMPROVE VENTILATION

- Suggestion to improve ventilation by opening doors and windows helped to reduce mercury concentrations significantly.

## CONCLUSION

- **Results** from Chemistry Department **confirmed** that the material found at the PBA facility is **Hg**.
- All **83 exposed individuals** were **identified** and diagnostic tests have been conducted (blood & urine Hg)
- **Hg vapor measurements** using Hg Gas Monitor has **facilitated the HAZMAT team** in ensuring the decontamination procedure was **effective**.
- **Investigation** is still ongoing to identify the culprit who dumped the mercury at abandoned PBA facility.
- It is hoped that the mercury spill has **increased awareness** of the public regarding Hg toxicity and thus be more conscious.